IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1-39. (Cancled)

40. (Currently amended) A heart function analysis apparatus comprising:

an extraction section configured to extract a cardiac wall contour from each of a plurality of heart images generated in a time-series;

a division ~~section~~ unit configured to divide the cardiac wall contour of each of the heart images into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart as a reference; and

~~means for obtaining an amount of a cardiac wall movement by correlating the cardiac wall contour divisions of one of the heart images to those of another~~

a division point corresponding unit configured to correspond first division points of the cardiac wall contour of one of the heart images to second division points of the cardiac wall contour of the other of the heart images between a plurality of time phases.

41. (Previously presented) The apparatus according to claim 40, wherein the point having a structural feature corresponds to at least one of a cardiac apex, an annulus valva and a papillary muscle.

42. (Currently amended) The apparatus according to claim 40, wherein ~~said means for obtaining a cardiac wall movement~~ the division point corresponding unit comprises: means for classifying the cardiac wall contour divisions ~~for plural positions~~ of [[a]] the cardiac wall contour to display at least the adjacent contour divisions with different colors or different luminance.

43. (Currently amended) A heart function analysis apparatus comprising:

an extraction ~~section~~ <u>unit</u> configured to extract a cardiac wall contour <u>of a cardiac</u> <u>wall</u> for each of a plurality of heart images generated in a time-series;

a division ~~section~~ <u>unit</u> configured to divide the cardiac wall contour of each of the heart images into a plurality of cardiac wall contour divisions <u>at a plurality of division points,</u> using a point having a structural feature of the heart as a reference;

~~determination means for determining~~ <u>a reference determination unit configured to</u> <u>determine</u> ~~from~~ <u>one of</u> the heart images ~~an~~ <u>as a reference</u> image corresponding to a reference time;

~~means for obtaining an amount of movement from the cardiac wall contour divisions~~ ~~corresponding to the image corresponding to the reference time or division points of the~~ ~~cardiac wall contour divisions, for each cardiac wall contour division or each division point;~~

<u>a division point corresponding unit configured to correspond first division points of</u> <u>the cardiac wall contour divisions of the reference image to second division points of the</u> <u>cardiac wall contour divisions of another of the heart images;</u> and

a display device configured to display ~~the amount of movement~~ <u>a movement distance</u> <u>between corresponding two of the first division points and the second division points</u> <u>corresponded to each other together with the cardiac wall</u> ~~with one of a numerical display, a~~ ~~graphical display and a color display of the cardiac wall~~.

44. (Currently amended) A heart function analysis apparatus comprising:

an input ~~section~~ <u>unit</u> configured to input heart images generated in a time-series ~~and~~ ~~speed information of heartbeats synchronizing with the heart images~~;

an extraction ~~section~~ <u>unit</u> configured to extract a cardiac wall contour for each <u>of the</u> heart image<u>s</u>;

a division ~~section~~ unit configured to divide the cardiac wall contour ~~of each heart image~~ into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart as a reference;

a division point corresponding unit configured to correspond first division points of the cardiac wall contour divisions of one of the heart images to second division points of the cardiac wall contour divisions of another of the heart images between a plurality of time phases;

a velocity detection unit configured to detect velocity information of heart tissues;

a classification ~~section~~ unit configured to classify the ~~speed~~ velocity information ~~of heartbeats~~ for each ~~of positions~~ of the cardiac wall contour divisions corresponding to the first division points and the second division points;

~~means for obtaining a speed statistic for each position of the cardiac wall contour divisions;~~ and

a display device configured to display the ~~speed statistic~~ velocity information with at least one of a numerical display, a graph display and a color display of a cardiac wall.

45. (Currently amended) A heart function analysis apparatus comprising:

an input ~~section~~ unit configured to input heart images generated in a time-series ~~and speed information of heartbeats synchronizing with the heart images~~;

an extraction ~~section~~ unit configured to extract a cardiac wall contour from each of the heart images;

a division ~~section~~ unit configured to divide the cardiac wall contour into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart as a reference point;

a reference determination unit configured to determine one of the heart images as a reference image corresponding to a reference time;

a division point corresponding unit configured to correspond first division points of the cardiac wall contour divisions of the reference image to second division points of the cardiac wall contour divisions of another of the heart images;

~~means for obtaining an amount of movement of each cardiac wall contour division for each position of the cardiac wall contour divisions;~~

a calculation unit configured to calculate a movement distance between corresponding two of the first division points and the second division points for each of the contour divisions to obtain a plurality of movement distances; and

a detection ~~section~~ unit configured to ~~detect a dynamic range of the amount of movement for at least one of each cardiac wall contour division and each division point of the cardiac wall contour division;~~

~~an allocation section configured to allocate a display color, used for displaying the speed information on a display screen, to the dynamic range; and~~

a display device configured to display the contour divisions with different display states according to the ~~speed information on the display screen with the allocated color~~ movement distances.

46. (Currently amended) A heart function analysis apparatus comprising:

means for extracting a plurality of cardiac wall contours from a plurality of heart images generated in a time-series;

means for dividing each of the cardiac wall contours into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart [[us]] as a reference; and

~~means for obtaining an amount of a cardiac wall movement by correlating the cardiac wall contour divisions of one of the heart images to those of another.~~

means for corresponding first division points of the cardiac wall contour divisions of the reference image to second division points of the cardiac wall contour divisions of another of the heart images;

means for calculating a movement distance between corresponding two of the first division points and the second division points.

47. (Previously presented) The apparatus according to Claim 46, wherein the point having a structural feature corresponds to at least one of a cardiac apex, an annulus valve and a papillary muscle.

48. (Currently amended) The apparatus according to claim 46, ~~wherein said means for obtaining a cardiac wall movement~~ which further comprises:

means for classifying the cardiac wall contour divisions for each ~~position~~ of a the cardiac wall contours; and

a display device which displays at least adjacent contour divisions with different colors or different luminance.

49. (Currently amended) A heart function analysis apparatus comprising:

means for extracting a plurality of cardiac wall contours from a plurality of heart images generated in a time-series, respectively;

means for dividing each of the cardiac wall contours of each of the heart images into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart as a reference;

means for determining ~~from~~ one of the heart images ~~an~~ as a reference image corresponding to a reference time;

means for corresponding first division points of the cardiac wall contour divisions of the reference image to second division points of the cardiac wall contour divisions of another of the heart images;

~~means for obtaining an amount of movement from the cardiac wall contour divisions corresponding to the image corresponding to the reference time or division points of the cardiac wall contour divisions for each cardiac wall contour division or each division point;~~

means for calculating a movement distance between corresponding two of the first division points and the second division points for each of the contour divisions; and

a display device configured to display the ~~amount of~~ movement distance with one of a numerical display, a graphical display and a color display of the cardiac wall.

50. (Currently amended) A heart function analysis apparatus comprising:

means for inputting a plurality of heart images generated in a time-series and ~~speed~~ velocity information of ~~heartbeats synchronizing with the heart images~~ heart tissues;

means for extracting a plurality of cardiac wall contours from the heart images, respectively;

means for dividing each of the cardiac wall contours of each of the heart images into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart as a reference;

means for corresponding first division points of one of the cardiac wall contours to second division points of another of the cardiac wall contours between a plurality of time phases;

means for classifying the ~~speed~~ velocity information ~~of heartbeats~~ for each ~~position~~ of the ~~cardiac wall contour divisions~~ division points;

~~means for obtaining a speed statistic for each position of the cardiac wall contour divisions; and~~

a display device configured to display the ~~speed statistic~~ velocity information with at least one of a numerical display, a graph display and a color display of a cardiac wall.

51. (Currently amended) A heart function analysis apparatus comprising:

means for inputting a plurality of heart images generated in a time-series ~~and speed information of heartbeats synchronizing with the heart images~~;

means for extracting a plurality of cardiac wall contours from the heart images, respectively;

means for dividing each of the cardiac wall contours into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart as a reference point;

means for corresponding first division points of one of the cardiac wall contours to second division points of another of the cardiac wall contours between a plurality of time phases;

~~means for obtaining an amount of movement of each cardiac wall contour division for each position of the cardiac wall contour divisions;~~

means for calculating a movement distance between corresponding two of the first division points and the second division points for each of the contour divisions to obtain a plurality of movement distances relative to the first division points and the second division points;

~~means for detecting a dynamic range of the amount of movement for each cardiac wall contour division or each division points of the cardiac wall contour division;~~

means for allocating a display color~~s, used for displaying the speed information on a display screen, to the dynamic range~~ to the contour divisions according to the movement distances; and

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a display device configured to display ~~the speed information on the display screen with the allocated color~~ the contour divisions according to the allocated colors.

52. (Currently amended) A heart function analysis method comprising:

extracting a cardiac wall contour from each of heart images generated in a time-series;

dividing the cardiac wall contour of each of the heart images into a plurality of cardiac wall contour divisions at a plurality of division points, using a point having a structural feature of the heart as a reference; ~~and~~

corresponding first division points of the cardiac wall contour of one of the heart images to second division points of the cardiac wall contour of the other of the heart images between a plurality of time phases; and

~~obtaining an amount of cardiac wall movement by correlating the cardiac wall contour divisions of one of the heart images to those of another~~

calculating a movement distance between corresponding two of the first division points and the second division points for each of the contour divisions to obtain a plurality of movement distances relative to the first division points and the second division points.

53. (Previously presented) The method according to claim 52, wherein the point having a structural feature corresponds to at least one of a cardiac apex, an annulus valva and a papillary muscle.

54. (Currently amended) The method according to claim 52, ~~wherein the step for obtaining a cardiac wall movement~~ which comprises:

classifying the cardiac wall contour divisions ~~for each position of a cardiac wall~~ according to the movement distances to display at least the adjacent contour divisions with different colors or different luminance.

55. (Currently amended) The method according to claim 52, which further ~~comprising~~ comprises:

determining as a reference image corresponding to a reference time point ~~from among~~ the one of the heart images generated in a time series~~; and said step of obtaining an amount of cardiac wall movement obtaining the amount of cardiac wall movement from the reference image for each cardiac wall contour division or each division point of the cardiac wall contour division~~.

56. (Currently amended) The method according to claim 55, further comprising:

displaying at least the ~~amount of cardiac wall movement~~ contour divisions with different colors or different luminance according to the movement distances.

57. (Currently amended) The method according to claim 52, further comprising:

generating velocity information of heart tissues;

classifying the ~~speed~~ velocity information ~~of heartbeats~~ for each ~~position~~ of the cardiac wall contour divisions;

~~obtaining a speed statistic for each position of the cardiac wall contour divisions~~; and

displaying the ~~speed statistic~~ velocity information with at least one of a numerical display, a graph display and a color display of the cardiac wall.

58. (Currently amended) The method according to claim 52, further comprising:

detecting a dynamic range of ~~an amount of movement~~ velocity information of each of the cardiac wall contour divisions or each of the division points; and

~~allocating a display color used for~~ displaying the ~~speed~~ velocity information ~~of heartbeats~~ on a display screen ~~to~~ as changing a display color in the dynamic range.